

SURVEY REPORT

sumo

Survey

**GEOPHYSICS FOR
ARCHAEOLOGY &
ENGINEERING**

**Land at Marston Lane, Stafford,
Staffordshire**

Client
CgMs Heritage (part of RPS)

Survey Report
11843

Date
October 2017

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GEOPHYSICAL SURVEY REPORT

Project name:
**Land at Marston Lane, Stafford,
Staffordshire**

SUMO Job reference:
11843

Client:
CgMs Heritage (part of RPS)

Survey date:
28-29 September 2017

Report date:
20 October 2017

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DIGITAL CONTENT (Archive Data CD/DVD)

- Minimally Processed Greyscale Images and XY Trace Plots in DWG format
- Digital Copies of Report Text and Figures (both PDF and native formats)

1 SUMMARY OF RESULTS

The magnetometer and aerial photogrammetry surveys at Marston Lane, Stafford have confirmed the presence of former drainage channels and land drains. A large rectangular platform earthwork is visible in the photogrammetry results, and is of uncertain origin. However, it is likely to be associated with the modern made ground that surrounds it. Further evidence of water meadow channels and evidence of ridge and furrow cultivation are visible at the southern extent of the photogrammetry datasets.

2.1 Background synopsis

SUMO Services Ltd were commissioned to undertake a combined geophysical and aerial photogrammetry survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by **CgMs Consulting**.

2.2 Site details

NGR / Postcode	SJ 920 265 / ST18 9SZ
Location	The site is located at the northern extent of Stafford, immediately to the east of Marston Lane. The site is bounded to the west by Marston Brook with agricultural land and farm buildings to the south and south-west.
HER/SMR	Staffordshire
District	Stafford
Parish	Creswell CP
Topography	Undulating
Current Land Use	Grassland
Weather	Magnetometer - Overcast, dry Photogrammetry - warm, stable conditions with mixture of sunshine and cloud
Geology	Solid: Mercia Mudstone Group - mudstone and halite-stone. Superficial: Alluvium - clay, silt, sand and gravel (BGS 2017).
Soils	Midelnay Association (813a) - stoneless clayey soils mostly overlying peat (SSEW 1983).
Archaeology	A post-medieval water meadow system (HER:53616) is recorded within the site. There are surface remains in the form of earthworks which likely relate to this, in the northern part of the site. Associated drainage channels are also likely to survive as subsurface remains. No evidence of sluice gates or structures were noted during a site visit (CgMs 2016).
Survey Methods	Magnetometer survey (fluxgate gradiometer)
Study Area	c.4.3 ha - approximately 0.9ha could not be surveyed using magnetometry due to farm buildings.

2.3 Aims and Objectives

To locate and characterise magnetic anomalies of possible archaeological interest and to reveal otherwise unknown earthworks and features which may indicate the presence of archaeology within the study area.

3 METHODS, PROCESSING & PRESENTATION

3.1 Standards & Guidance

This report and all fieldwork have been conducted in accordance with the latest guidance documents issued by Historic England (EH 2008) (then English Heritage), the Chartered Institute for Archaeologists (CIfA 2014) and the European Archaeological Council (EAC 2016).

3.2 Survey methods

Detailed magnetic survey and aerial photogrammetry were chosen as efficient and effective methods of locating archaeological anomalies and earthworks.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1.0m	0.25m
Photogrammetry	UAV with gimbal mounted camera	N/A	1.9cm/pix

More information regarding the magnetometry technique is included in Appendix A.

3.3 Data Processing

3.3.1 Magnetometer

The following basic processing steps have been carried out on the data used in this report:

De-stripe; de-stagger; interpolate

3.3.2 Photogrammetry

The data images are then processed in photogrammetry software to generate point cloud, mesh and textured models of the ground surface.

The DEM files are processed further using relief visualisation tools or geographical information system software. The DEM files are processed further using relief visualisation tools or geographical information system software.

A detailed processing report with further technical information for this technique is included in Appendix C.

3.4 Presentation of results and interpretation

3.4.1 Magnetometer

The presentation of the results for each site involves a grey-scale plot of processed data. Magnetic anomalies are identified, interpreted and plotted onto the 'Interpretation' drawings. The minimally processed data are provided as a greyscale image in the Archive Data Folder with an XY trace plot in CAD format. A free viewer is available: <https://viewer.autodesk.com>

When interpreting the results, several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to other existing evidence, the anomalies will be given

specific categories, such as: *Abbey Wall* or *Roman Road*. Where the interpretation is based largely on the geophysical data, levels of confidence are implied, for example: *Probable*, or *Possible Archaeology*. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as cropmarks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification *Possible*.

3.4.2 **Photogrammetry**

Output files are generated in the form of georeferenced digital elevation models (Figures 04 & 05) and orthophotographs (Figure 04).

4 RESULTS

The survey has been divided into two survey areas (Areas 1-2) and specific anomalies have been given labels [1], [2], [A], [B] which appear in the text below, as well as on the Interpretation Figure(s).

4.1 **Magnetometer**

4.1.1 **Probable / Possible Archaeology**

No magnetic responses have been recorded that could be interpreted as being of archaeological interest.

4.1.2 **Uncertain**

Two small, weakly magnetic, curved linear trends have been detected in the west of Area 1 and the centre of Area 2. These are of uncertain origin, though they are not likely to have an archaeological provenance; they are more probably of modern agricultural origin, or reflect a chance alignment of magnetic debris.

4.1.3 **Agricultural – Land Drains**

A curving linear alignment of magnetic debris [1] has been detected in Area 1 and extends south into Area 2, while a similar linear response [2] lies perpendicular to the anomaly in the north. These responses all correspond with the location of former drainage channels, visible on historic OS mapping from 1881 to 1982. Both responses have been detected in the digital elevation model, in the form of a double bank and ditch [A; D].

Further weak, bipolar linear anomalies [3] detected in the north-east of Area 1 and north of Area 2 are likely to be related to modern land drains.

4.1.4 **Ferrous / Magnetic Disturbance**

A large area of strong magnetic disturbance [4] is visible across the southern portion of Area 1. This is characteristic of an area of made ground, and is likely to have modern origins.

Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and their form is best illustrated in the XY trace plots. These responses are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil and are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

4.2 Photogrammetry

4.2.1 *Drainage Channels/Water Meadow*

A double bank and ditch with some associated rectilinear and perpendicular features [A] is visible in the north of the site. The double bank and ditch and a response at right angles to its east, correspond with the location of the former drainage channel, visible in the magnetometer data and on historic OS mapping. The drainage channel can be seen extending further south [D], which again matches the geophysical survey results and information from historic maps.

At the southern extent of the area, outside of the magnetometry survey area, a series of linear anomalies [E] can be seen. These are indicative of former water meadow channels, and correspond with information from the desk-based assessment whereby remains of a post-medieval water meadow are recorded on the site.

4.2.2 *Rectangular Platform*

A large rectangular platform [B-C] is visible in the south of Area 1, and lies within the area of made ground detected in the magnetometer data. The exact origin of this platform is unknown, though its location within the area of made ground suggests that they are related. It is therefore likely that this earthwork feature is of modern, rather than archaeological, origin.

4.2.3 *Agriculture*

To the south of the farm buildings, several parallel, linear earthwork features [F] are visible. These are a result of medieval ridge and furrow cultivation.

5 DATA APPRAISAL & CONFIDENCE ASSESSMENT

5.1 Historic England guidelines (EH 2008) Table 4 states that the average magnetic response on mudstone and halite-stone can be variable, while alluvial deposits have the potential to mask weaker archaeological responses. The strong magnetic disturbance in Area 1 also has the potential to mask anomalies. However, given that remains of former drainage channels have been detected, it can be determined that the survey has been effective.

5.2 The conditions for the photogrammetry survey were favourable, with dry, warm and stable weather, and few obstructions. Several earthwork features have been detected in the survey, demonstrating that the technique has been successful.

6 CONCLUSION

6.1 The magnetometer and aerial photogrammetry surveys at Marston Lane, Stafford have confirmed the presence of former drainage channels and land drains. A double bank and ditch visible in the digital elevation model corresponds with the course of an infilled drainage channel which has been detected in the geophysical data, and is also recorded on historic OS mapping. A large rectangular platform earthwork is likely to be associated with the modern made ground that surrounds it, though its exact origin cannot be determined with confidence.

- 6.2 To the south of the geophysical survey area, further evidence of water meadow channels has been identified, along with earthworks associated with medieval ridge and furrow.

7 REFERENCES

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